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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 09/848,577 | 05/03/2001 | Young-Hoon Park | YPL-0017 | 6816 |

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EXAMINER

MOORE, KARLA A

| ART UNIT | PAPER NUMBER |
|----------|--------------|
| 1763 | 5 |

DATE MAILED: 09/11/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

TC-5

| | | | |
|------------------------------|-------------------------|------------------|--|
| Office Action Summary | Application No. | Applicant(s) | |
| | 09/848,577 | PARK, YOUNG-HOON | |
| | Examiner Karla Moore | Art Unit 1763 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on _____.
- 2a) This action is FINAL. 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) Claim(s) _____ is/are allowed.
- 6) Claim(s) 1-17 is/are rejected.
- 7) Claim(s) _____ is/are objected to.
- 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on 03 May 2001 is/are: a) accepted or b) objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) The proposed drawing correction filed on _____ is: a) approved b) disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.
- 14) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) The translation of the foreign language provisional application has been received.
- 15) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

| | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) <u>4</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in-

(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or
(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

2. Claims 1,3-7,14 and 17 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 5,338,363 to Kawata et al.

3. Kawata et al. disclose a thin film deposition reactor in Figure 10, comprising: a reactor block (201) on which a wafer is placed; a showerhead plate (17) for uniformly maintaining a predetermined pressure by covering the reactor block; a wafer block (5) installed in the reactor block, on which the wafer is to be seated; an exhausting portion (20) connected to the reactor block for exhausting a gas from the reactor block; a first connection line (19a,19b) in communication with the shower head plate, through which a first reaction gas and/or inert gas flows; a second connection line (28) in communication with the showerhead plate, through which a second reaction gas and/or inert gas flow; and a diffusion plate (11) mounted on a lower surface of the showerhead plate, the diffusion plate having a plurality of spray holes (12) which are in communication with the first connection line and face the upper face of the wafer to spray the first reaction gas and/or inert gas onto the wafer, and a plurality of nozzles (Figure 5, 25—upper surface and narrow portion leading to reaction space 4) which are in communication with the second

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connection line and extend toward the inner side surface of the reactor block to spray the second reaction gas and/or inert gas toward the edges of the wafer.

4. With respect to claim 3, although not illustrated, Kawata et al. teach the diffusion plate having a lower surface of convex form (column 6, rows 32-38).

5. With respect to claim 4, the diffusion plate further comprises a first diffusion plate (11a) in communication with the plurality of spray holes and the first connection line, and a second diffusion plate (11b) in communication with the plurality of nozzles and the second connection line (see Figure 5).

6. With respect to claim 5, the reactor further comprises a first mixing portion (inside of 17) at a center of the inside of the diffusion plate for mixing the first reaction gas and diffusing the mixture to the spray holes.

7. With respect to claim 6, the reactor further comprises a second mixing portion (Figure 5, not numbered--square chamber like portion between 25 and 27) between the second connection line and the showerhead plate (laterally), the second mixing portion having an auxiliary diffusion plate (26) in which holes (27 and/or 46) are formed.

8. With respect to claim 7, the area of the diffusion plate on which the spray holes are formed is larger than the wafer (Figure 10).

9. With respect to claims 14 and 17, the reactor further comprises a pumping baffle (13) which is installed on the outer circumference of the wafer block, the pumping baffle comprising a sidewall (above baffle and towards center of reactor) placed around the lateral side of the wafer block, a bottom wall (below baffle and towards exterior of baffle) extended outward from a lower end of the sidewall, and holes (for heater 38 and leading to exhaust 20) formed in the bottom wall. Both the heater holes and exhaust holes are formed on each side of the reactor and are therefore symmetrical.

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kawata et al. as applied to claims 1,3-7,14 and 17 above, and further in view of U.S. Patent No. 5,439,524 to Cain et al.
12. Kawata et al. disclose the apparatus substantially as claimed.
13. However, Kawata et al. fail to teach a diffusion plate with a lower surface of a concave form.
14. Cain et al. teach a diffusion plate with a concave form (Figure 2) for the purpose of significantly improved uniformity of processing (column 3, rows 48-57 and column 4, rows 40-46).
15. It would have been obvious to one of ordinary skill in the art at the time the Applicant's invention was made to have provided a diffusion plate with a concave form in Kawata et al. in order to provide improved uniformity of processing as taught by Cain et al.
16. Claims 8, 9 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kawata et al. as applied to claim 1,3-7,14 and 17 above, and further in view of U.S. Patent No. 5,976,261 to Moleshi et al.
17. Kawata et al. disclose the invention substantially as claimed.
18. However, Kawata et al. fail to teach specifically the diameter of the spray holes being 1 to 2.5 mm or the number of spray holes being 100-1000.
19. Moleshi et al. teach that in showerhead design the diameter and number of spray holes can be varied to optimize flow control and uniformity (column 5, rows 34-36).
20. It would have been obvious to one of ordinary skill in the art at the time the Applicant's invention was made to have varied the diameter and number of spray holes in Kawata et al. in order to optimize flow control and uniformity as taught by Moleshi et al.
21. Claim 10 rejected under 35 U.S.C. 103(a) as being unpatentable over Kawata et al. as applied to claims 1,3-7,14 and 17 above, and further in view of U.S. Patent No. 5,425,812 to Tsutahara et al.
22. Kawata et al. disclose the invention substantially as claimed.

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23. However, Kawata et al. fail to teach a spray hole comprising a lower and upper end and the upper end has a diameter larger than that of the lower end and a step portion is formed between the upper and lower end.

24. Tsutahara et al. teach a spray hole configuration (Figure 15, column 9, rows 21-26) comprising a larger diameter upper portion and a smaller diameter lower portion with a step portion formed in between for the purpose of maintaining blowout flow from each hole at a constant rate, to supply thoroughly diffused gas to the surface of the wafer and to prevent drifting of the flow.

25. It would have been obvious to one of ordinary skill in the art at the time the Applicant's invention was made to have provided a spray hole configuration in Kawata et al. comprising a larger diameter upper portion and a smaller diameter lower portion with a step portion formed in between in order to maintain blowout flow from each hole at a constant rate, supply thoroughly diffused gas to the surface of the wafer and prevent drifting of the flow as taught by Tsutahara et al.

26. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kawata et al. and Tsutahara et al. as applied to claim 10 above, and further in view of Japanese Patent No. 09316644 to Arai et al.

27. The prior art applied above discloses the invention substantially as claimed.

28. However, the prior art fails to teach a diffusion plate with a thickness of at least 5mm.

29. Arai et al. teach the use of a diffusion plate with a thickness of 5 mm for the purpose of obtaining a thin film of good quality in a short time (solution of abstract).

30. It would have been obvious to one of ordinary skill in the art at the time the Applicant's invention was made to have provided a diffusion plate with a thickness of 5mm in the prior art applied above in order to obtain a thin film of good quality in a short time as taught by Arai et al.

31. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kawata et al. as applied to claims 1,3-7,14 and 17 above, and further in view of U.S. Patent No. 5,076,207 to Washitani et al.

32. Kawata et al. disclose the invention substantially as claimed.

33. However, Kawata et al. fail to teach a distance between the diffusion plate and wafer block of 20 to 50 mm.

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34. Washitani et al. teach a distance between the diffusion plate and wafer block of 20 to 50 mm for the purpose of obtaining a satisfactory film forming speed and a high degree of surface uniformity (specifically, 8-25 mm; column 5, rows 13-15).

35. It would have been obvious to one of ordinary skill in the art at the time the Applicant's invention was made to have allowed a distance of 20 to 50 mm between the diffusion plate and wafer block in Kawata et al. in order to obtain a satisfactory film forming speed and a high degree of surface uniformity as taught by Washitani et al.

36. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kawata et al. as applied to claims 1,3-7,14 and 17 above, and further in view of Japanese Patent No. 09316644 to Arai et al.

37. Kawata et al. discloses the invention substantially as claimed.

38. However, the Kawata et al. fails to teach a diffusion plate with a thickness of at least 5mm.

39. Arai et al. teach the use of a diffusion plate with a thickness of 5 mm for the purpose of obtaining a thin film of good quality in a short time (solution of abstract).

40. It would have been obvious to one of ordinary skill in the art at the time the Applicant's invention was made to have provided a diffusion plate with a thickness of 5mm in Kawata et al. in order to obtain a thin film of good quality in a short time as taught by Arai et al.

Conclusion

41. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Karla Moore whose telephone number is 703.305.3142. The examiner can normally be reached on Monday-Friday, 8:30am-5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory Mills can be reached on 703.308.1633. The fax phone numbers for the organization where this application or proceeding is assigned are 703.872.9310 for regular communications and 703.872.9311 for After Final communications.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703.308.0661.

km

September 5, 2002


GREGORY MILLS
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700